SVKM's
D. J. Sanghvi College of Engineering

Program: B.Tech in Information Technology **Academic Year: 2022** **Duration: 3 hours**
Date: 25.01.2023
Time: 09:00 am to 12:00 pm
Subject: Digital Logic Design (Semester III) **Marks: 75**

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.
(1) This question paper contains two pages.
(2) All Questions are Compulsory.
(3) All questions carry equal marks.
(4) Answer to each new question is to be started on a fresh page.
(5) Figures in the brackets on the right indicate full marks.
(6) Assume suitable data wherever required, but justify it.
(7) Draw the neat labelled diagrams, wherever necessary.

Question No.		Max. Marks
Q1 (a)	Perform following conversions: i. Convert Binary number (11001001.11001) to its Decimal Equivalent. ii. Convert Decimal number (3004.72) into its Hexadecimal Equivalent. iii. Convert Octal number (6735) into its Hexadecimal Equivalent. iv. Convert Hexadecimal number (8D4.6) into its Decimal Equivalent.	[02] [02] [02] [02]
Q1 (b)	Answer the following questions: i. Why excess-3 codes are called as self-complementary binary codes? Justify with example. ii. Why gray codes are called as self-reflecting binary codes? Justify with example. iii. Elaborate the meaning of weighted and non-weighted codes with examples. iv. **OR** Perform following operations: i. Add the Binary numbers $(11011010)_2$ and $(10010011)_2$. ii. Perform $(38)_{10}$ - $(29)_{10}$ by converting them into Binary. iii. Perform $(246)_{10} - (435)_{10}$ using 2's Complement method.	[02] [02] [03] [02] [02] [03]
Q2 (a)	Simplify <u>any ONE</u> of the following using K Maps also draw the circuit diagram of final expression: i. $F(A, B, C, D) = \sum m(0,1,5,9,13,14,15) + d(3,4,7,10,11)$ **OR** ii. $F(A, B, C, D) = \pi M(4,6,8,10,12,13,14) + d(0,2,5)$	[07] [07]

Q2 (b)	Prove the following expressions using Boolean Algebra: i. $\overline{(A+\overline{BC})}(A\overline{B}+\overline{(ABC)}=\overline{A}BC$ ii. $WX+X\overline{Y}+YZ+X\overline{Z}=X+YZ$ iii. $AB+\overline{AC}+A\overline{B}C(AB+C)=1$ iv. $\overline{X}(X+Y)+\overline{Z}+ZY=Y+\overline{Z}$	 [02] [02] [02] [02]
Q3 (a)	A 4-bit binary number is represented as A_3 A_2 A_1 A_0 where A_3 is the MSB. Design a logic circuit that will produce a HIGH output whenever the Binary number is greater than $(0010)_2$ and less than $(1000)_2$.	[08]
Q3 (b)	Implement following functions using De-multiplexer: i. F1(A, B, C) = ∑m (0,3,7) ii. F2(A, B, C) =∑m (1,2,5) **OR** Discuss what is Priority Encoder? Draw its Truth table, K maps and Circuit Diagram.	[07] [07]
Q4 (a)	Draw 4 bit down counter and describe its working **OR** What is the difference between a latch and a Flip flop? With a neat sketch illustrate working of Gated JK Latch.	[08] [08]
Q4 (b)	With the help of a neat diagram, summarize the functioning of a 4-bit bidirectional shift register.	[07]
Q5 (a)	With a suitable diagram describe the 8086 Microprocessor Architecture. **OR** With suitable examples discuss various instruction word formats of any computer processor organizer.	[10] [10]
Q5 (b)	Describe any 5 addressing modes of 8086 Microprocessor with examples.	[05]